MASTER OF SCIENCE
IN
PHYSICS

OPTIMIZATION OF MULTIPLE PLATFORM PRECISION GEOLOCATION THROUGH COMPUTER SIMULATION

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The fundamental mathematical relationships that govern Time Difference of Arrival (TDOA) geolocation suggest that to reduce the positional uncertainty in the target, the baseline between the two collectors can be lengthened. A multiple-platform precision geolocation system is modeled using Operational Performance Simulation (OPS) software and tested with various baseline lengths to determine the impact on system performance.

DoD KEY TECHNOLOGY AREAS: Air Vehicles, Space Vehicles, Command, Control and Communications, Electronic Warfare, Sensors, Modeling and Simulation

KEYWORDS: Computer Simulation, Unmanned Aerial Vehicles, Precision Geolocation

ADVANCED APPLICATIONS FOR 0.53 μm LASER LIGHT

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Use of the National Ignition Facility with green light as the laser output is an intriguing option for advanced applications ranging from inertial fusion to production of compact x-ray sources. Particular attention is given to the potential use of 0.53 μm light to produce a high-energy x-ray source. This application requires the efficient generation of high-energy electrons which can subsequently produce high-energy x-rays as they transport into gold or other high Z wall. One- and two-dimensional computer simulations are used to explore high-energy electron generation by intense 0.53 μm laser light in a plasma with density near one-quarter the critical density. Significant absorption is shown to occur into high-energy electrons with an effective temperature which is reduced by the development of ion fluctuations. The results compare favorably with some recent experiments using 0.53 μm light.

DoD KEY TECHNOLOGY AREAS: Modeling and Simulation, Computing and Software

KEYWORDS: High Intensity Lasers, Laser-Plasma Coupling, National Ignition Facility, Fusion, Computer Simulations